2P224 A Multiscale Kinetic Scheme Extracted from EGFR-Grb2 Single Molecule Reaction

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We apply a recently developed model-free time series analysis method to single molecule time series of dissociation and association kinetics between epidermal growth factor receptor (EGFR) and Grb2 to elucidate the underlying multiscale dynamics by extracting multiscale state space network (SSN). To deal with nonstationarity in time series, we proposed a simple scheme to construct a series of multiple SSN from a set of resampled data sequences. We found that the underlying SSNs change their topographical structure as a function of the timescale: while the corresponding SSN is simple at the short timescale, the SSN at the longer timescales becomes rather complicated in order to capture multiscale nonstationary kinetics emerging at longer timescales.

2P225 新世界ザルの苦味受容体 TAS2R1 および TAS2R4 の機能的多様性

Functional diversity of bitter taste receptors TAS2R1 and TAS2R4 in New World monkeys

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Bitter taste perception is mediated by G-protein-coupled bitter taste receptors (TAS2Rs). In recent years, human TAS2Rs have been functionally characterized. However, functional diversity of TAS2Rs among different species, which is thought to be related to adaptations to species-specific environments, is largely unknown. In this study, we focused on TAS2Rs of New World monkeys, which have variable amino acid sequences among different species. By calcium imaging in HEK293T cells, we found that TAS2R1 and TAS2R4 orthologues of marmoset, capuchin monkey, owl monkey and spider monkey exhibit different sensitivity for some bitter tastants. Furthermore, we performed site-directed mutagenesis to identify the amino acid residues responsible for the functional differences.

2P226 コレラ菌の尿素走性と培養温度依存性 Urea taxis of *Vibrio cholerae* and its temperature dependence

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Vibrio cholerae, an etiological agent of cholera, showed taxis toward various amino acids for their survival and virulence. We found that *V. cholerae* is attracted by urea, a common and essential organic compound in mammals, such as humans, used for nitrogen metabolisms. Interestingly, both tactic responses to urea and serine were significantly enhanced when cells were cultured at 37°C compared to those of cells cultured at 30°C, implying the relevance of taxis to urea and serine upon infection. Deletions of the *mlp24* and *mlp37* genes, encoding major chemoreceptors for various amino acids, significantly attenuated the urea taxis, suggesting that these chemoreceptors are also involved in urea taxis.

2P227 温度によるコレラ菌走化性受容体ホモログの発現制御機構の解析

Temperature control of chemoreceptor expression in *Vibrio cholerae*

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Vibrio cholerae, the etiological agent of cholera, shows chemotaxis that plays a role in pathogenicity. The bacterium has more than 40 homologs of methyl-accepting chemotaxis protein (MCP), which we name MCP-like protein (MLP). In this study, we examined whether *V. cholerae* modulates the MLP expression in response to changes in temperature. The response of wild-type cells to serine was stronger when cultured at 37°C than when cultured at 23°C or 30°C. Northern blotting revealed that cultivation at 37°C increases the cellular amount of mRNA of *mlp37*, encoding one of the two major amino acid chemoreceptors. These results suggest that expression of at least some *mlp* genes is modulated by culture temperature at the transcriptional level.

2P228 チャコウラナメクジの脳嗅覚中枢における自発振動活動の長時間相関解析

Long-range temporal correlations of oscillatory activities in the olfactory center in the land slug

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Spontaneous oscillation of activity in olfactory system is important for odor-information processing. We investigated the statistical property of spontaneous oscillation in the procerebrum (PC), an olfactory center of the land slug. We performed a detrended fluctuation analysis (DFA), which is a scaling analysis technique used to provide a quantitative parameter (scaling exponent, α). The fluctuation of spike timing of the PC possessed a long-term correlation at timescales larger than 10² spikes ($\alpha \sim 1.21$). The application of cycloheximide, an inhibitor of protein synthesis, induced a decrease in the scaling exponent α at the larger time window. This result indicates that the fluctuations of spike timings are characterized by a dynamics of mRNA translation in the PC.

2P229 チャコウラナメクジ嗅覚中枢における時空間神経活動パターンの膜電位イメージング

Fluorescent Voltage Imaging of Spatiotemporal Activity Patterns in the Olfactory Center of the Land Slug

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In the olfactory center (procerebrum; PC) of the land slug *Limax valentianus*, the local field potential (LFP) of the PC shows an oscillation of about 1 Hz, and the oscillatory activity was changed by various odor stimuli to the tentacle. In the present study, we examined spatiotemporal activity patterns in the PC by fluorescence voltage imaging technique. As a result, an oscillation of fluorescence intensity was observed in the PC, and the oscillation had a phase delay along the distal-proximal axis. After aversive odor stimuli, the phase delay disappeared, which shows coherent activities of neurons in the PC. By this technique, we also examined the function of the superior and inferior tentacles on the olfactory processing.